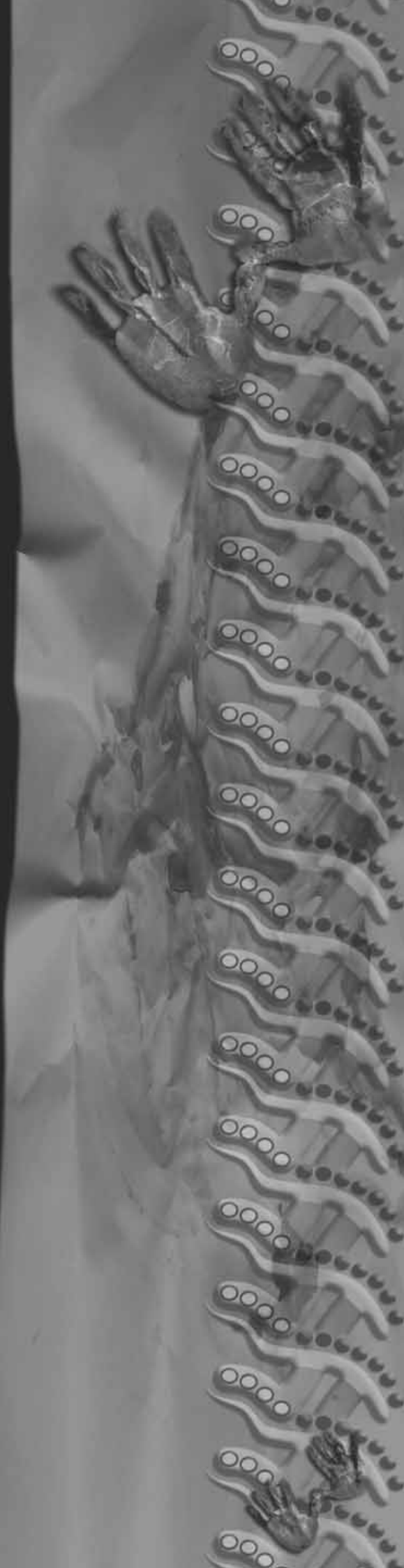




Northern
Territory
Government

Mathematics Chance and Data



Mathematics

Chance and Data

Outcome

Key Growth Point 1

Learners use intentional communication strategies to interact with people, objects and activities.

Learners demonstrating solid evidence of

CD KGP 1 Chance and Data

- actively seek and anticipate interactions with familiar people, activities, objects and environments
- use a limited repertoire of gestures, actions and vocalisation strategies to respond to a sensory cue actively

KGP 2

Learners use everyday language to state opinions on the possibility of a given event occurring. They identify common attributes in a collection of objects.

Indicators

Key Growth Point 1 has three distinct developmental stages organised into six levels. The Key Growth Points Continuum on page two (2) describes the earlier stages of this development, whilst the indicators below provide the curriculum scope for planning and assessing learning within **Key Growth Point 1**.

Level 5 Anticipate

- choose from a limited range of responses to seek attention, request and respond to people, materials, objects, activities, eg show excitement or protest when presented with familiar objects, activities, environments; reach out toward a familiar object
- explore materials and objects, eg reach out to explore the position of objects
- seek objects that may not exist in immediate environment, eg actively look for or request objects
- participate in shared activities with intermittent prompts and cues, eg copy some actions during number rhymes, songs and number games
- sustain concentration for short periods of time
- observe the results of their own actions with interest, eg notice changes in visual or auditory input as a result of touching an object
- remember learnt responses over more extended periods, eg return to or request favourite number games
- make simple choices, eg use a yes/no system when presented with one option or reach for preferred object when presented with two objects

Mathematics Key Growth Points Learning Continuum

Awareness	Engagement	Participation
<p>Level 1 Tolerate Learners allow themselves to be involved in an activity prompted by a familiar person. Learners are able to</p> <ul style="list-style-type: none"> • produce simple reflex responses in response to the sensations they are experiencing, eg vocalisation, eye rolling, actions in response to feeling pain • produce simple reflex responses in response to external stimuli, eg startle reflex to a loud noise • rely on communication partner to prompt interaction 	<p>Level 3 Respond Learners change their body language in a more sustained and consistent way. Learners are able to</p> <ul style="list-style-type: none"> • respond consistently to and show interest in familiar people, events and objects, eg point to known objects or people • react to new experiences, eg move towards an object, sound or movement source • accept and engage in co-active exploration of objects and environments, eg reach out and feel for objects as tactile cues to events 	<p>Level 5 Anticipate Learners use intentional communication strategies to interact with people, objects and activities. Learners are able to</p> <ul style="list-style-type: none"> • choose from a limited range of responses to seek attention, request and respond to people, materials, objects, activities, eg show excitement or protest when presented with familiar objects, activities, environments; reach out toward a familiar object • explore materials and objects, eg reach out to explore the position of objects • seek objects that may not exist in immediate environment, eg actively look for or request objects • participate in shared activities with intermittent prompts and cues, eg copy some actions during number rhymes, songs and number games • sustain concentration for short periods of time • observe the results of their own actions with interest, eg notice changes in visual or auditory input as a result of touching an object • remember learnt responses over more extended periods, eg return to or request favourite number games • make simple choices, eg use a yes/no system when presented with one option or reach for preferred object when presented with two objects
<p>Level 2 React Learners respond to a stimulus. Learners are able to</p> <ul style="list-style-type: none"> • take part in interactions, activities and experiences through body language, actions, vocalisations, eg attend briefly to lights, sounds or patterns of movement • intermittently appear alert and focus attention on certain people, objects or parts of objects, and experiences, eg focus on sensory aspects of stories or rhymes when prompted • give unexpected or intermittent reactions within an interaction, activity or experience, eg become excited in the midst of social activity 	<p>Level 4 Focus Learners respond purposefully to a stimulus. Learners are able to</p> <ul style="list-style-type: none"> • communicate consistent preferences and affective responses, eg reach out for favourite person • recognise familiar people, objects and experiences, eg recall an object that has been placed out of sight • perform actions by trial, error and improvement, eg hit a mathematical shape on a concept keyboard to make it appear 	<p>Level 6 Choose Learners request stimulus through gesture, action or vocalisation and are able to make a choice or express a preference. Learners are able to</p> <ul style="list-style-type: none"> • request interactions and activities with consistent use of gesture, actions or vocalisations, eg prompt another person to join in an activity • use learned responses over increasing periods of time to engage in activities and anticipate future events, eg indicate an area of the yard to go to • respond to options presented with actions, gestures and/or vocalisations clearly expressing their preference • attempt to solve problems systematically, eg bring an object to an adult in order to request a new activity • choose to select or reject from a number of presented options within and outside experiences, eg choose to taste new foods

Mathematics

Chance and Data

Outcome

Key Growth Point 2

KGP 1

Learners use intentional communication strategies to interact with people, objects and activities.

Learners use everyday language to state opinions on the possibility of a given event occurring. They identify common attributes in a collection of objects.

Learners demonstrating solid evidence of

CD KGP 2.1 Chance

- use everyday language to communicate beliefs concerning the likelihood of events or outcomes of situations
- use terms: will, won't, might, could

CD KGP 2.2 Data

- sort objects according to a criterion

KGP 3

Learners use reasoning to determine whether a given event is certain, possible or impossible and recognise that some events have a strong random element. They categorise collections of objects and determine which category is the largest.

Indicators

The curriculum scope for planning and assessing learning within **Key Growth Point 2**

Knowledge and skills

Working mathematically

Chance

- classify events using the language 'will happen', 'won't happen' and 'might happen' without necessarily qualifying or justifying beliefs

Chance

- sort cards depicting situations involving different degrees of likelihood, eg a monkey flying an aeroplane, a monkey eating a banana

Data

- sort and classify familiar objects using one criterion

Data

- separate a given set of objects from a collection using an obvious criterion, eg separate all the buttons from a collection of assorted objects
- group objects based on one criterion, eg sort pattern blocks into piles based on colour

Key Mathematical Language

could happen, will happen, won't happen, might happen, sort, group

Mathematics

Chance and Data

Outcome

Key Growth Point 3

KGP 2

Learners use everyday language to state opinions on the possibility of a given event occurring. They identify common attributes in a collection of objects.

Learners use reasoning to determine whether a given event is certain, possible or impossible and recognise that some events have a strong random element. They categorise collections of objects and determine which category is the largest.

Learners demonstrating solid evidence of

CD KGP 3.1 Chance

- identify familiar events which involve an element of chance
- recognise that repeating a 'chancy' action may result in different outcomes
- use terms: will happen, won't happen or might happen and justify with reference to events

CD KGP 3.2 Data

- sort objects into categories and count physical collections in order to determine which category is the largest

Band 1

Learners recognise that some events are more likely to occur than others. They understand the need for a common baseline and spatial alignment when comparing columns of physical collections.

Indicators

The curriculum scope for planning and assessing learning within **Key Growth Point 3**

Knowledge and skills

Working mathematically

Chance

- differentiate between guessing and reasoning when making a prediction
- describe events as 'possible' or 'impossible' and justify decision
- identify situations that have a strong random or 'chance' element, ie events where the outcome is uncertain such as the gender of an unborn child or the toss of a coin
- use language to demonstrate an understanding of the nature of chance events, eg 'I might roll a 6 again but I don't know for sure'

Chance

- investigate the outcomes of chance events, eg dropping a counter with different coloured faces and counting how many times each colour came up
- make conjectures about whether situations depicted in children's literature would be possible or impossible, eg the situations illustrated in Dr Seuss' (Theo LeSeig) *Oh the Thinks You Can Think*
- make predictions about what will happen next in children's stories where there is a repeated theme, eg Colin West's *Pardon? Said the Giraffe*

Data

- group objects according to a criterion and determine which group is the largest by counting
- arrange objects within each group into rows or columns to compare, although not necessarily evenly spaced or with reference to a baseline
- record information by writing the number of each object next to a picture of the object

Data

- sort a group of objects using more than one criterion, eg grab a random handful of objects such as toy farm animals or pattern blocks, sort and record according to one criterion then re-sort and record the same objects using a different criterion
- interpret unfamiliar picture displays of data, eg make up a story to fit an unlabelled and unfamiliar picture display

Indicators

The curriculum scope for planning and assessing learning within **Key Growth Point 3 (cont)**

Knowledge and skills

Working mathematically

Data (cont)

- record information by drawing pictures of the objects to represent the actual objects
- interpret 1:1 picture displays of familiar data to determine the most common item, eg counts 10 white cars and 4 red cars and so can state that because there are more white cars white is the more popular colour

Key Mathematical Language

guess, predict, reason, possible, impossible, certain

Mathematics

Chance and Data

Outcome

Band 1

KGP 3

Learners use reasoning to determine whether a given event is certain, possible or impossible and recognise that some events have a strong random element. They categorise collections of objects and determine which category is the largest.

Learners recognise that some events are more likely to occur than others. They understand the need for a common baseline and spatial alignment when comparing columns of physical collections.

Learners demonstrating solid evidence of

CD 1.1 Chance

- compare familiar events in terms of one event being more likely or less likely to happen than the other, based on prior experience (as opposed to mathematical reasoning)
- use terms 'possible' and 'impossible' with reference to discrete chance events such as rolling dice

CD 1.2 Data

- use a baseline when presenting data as physical columns (either spatially aligned physical collections or streamers matched to heights or lengths of objects for example)
- choose to count objects to compare sizes of collections without prompting

Band 2

Learners list possible outcomes for a given situation. They use reasoning to explain why one event is more likely than another.

Indicators

The curriculum scope for planning and assessing learning within **Band 1**

Knowledge and skills

Working mathematically

Chance

- classify familiar events as 'likely to happen' or 'unlikely to happen' based on experience
- distinguish between 'impossible' and 'possible but unlikely' events
- determine the limits of possibility for a discrete event, eg 'its impossible to get an 8 because this spinner only goes up to 7'

Chance

- match chance statements to proposed events, eg decide if the event 'it will rain tomorrow', is best described as 'will always happen', 'is likely to happen', 'is unlikely to happen' or 'will never happen'
- determine if a spinner is likely to land on a particular coloured sector when that sector is very large or very small

Data

- suggest counting as a way of comparing collections of data
- use tally marks to count data
- apply counting to the representation of data, allowing the use of 1:1 abstraction, eg paste or colour 5 squares to represent 5 students
- create bar or column graphs by colouring squares or by lining-up or stacking elements (ie not necessarily using a labelled vertical axis)

Data

- record how many trials are required to achieve a given outcome, eg how many throws of a die it takes each person to get a six
- conduct a class survey and display the results on a classroom wall or on graph paper, eg record how many people in the class have a birthday for each month.
- record the heights of class members using streamers and display these as a column graph with a horizontal axis, heading and labels

Indicators

The curriculum scope for planning and assessing learning within **Band 1 (cont)**

Knowledge and skills	Working mathematically
Data (cont) <ul style="list-style-type: none"> • apply baselines when creating bar or column graphs and other data representations • ensure elements within a bar or column are arranged in a line with consistent spacing and no overlaps • create 1:1 representations of length, eg cutting streamers to match heights or lengths of objects and pasting them along a baseline • interpret unfamiliar data represented in bar or column graphs, where the 1:1 representation of data is clearly presented 	Data (cont) <ul style="list-style-type: none"> • explain results of a class survey, with reference to the graph produced • describe relevant details of unfamiliar data presented as a 1:1 abstract representation of data (ie not a pictograph), eg 'there were almost as many red cars as blue cars seen, but almost twice as many white cars' • use technology to assist with the organisation and presentation of data, eg make a pictogram using a word table and icons
Key Mathematical Language	
classify, tally, likely, unlikely, bar graph, column graph, axis, heading (graph), labels (graph), aligned	

Mathematics

Chance and Data

Outcome

Band 2

Band 1

Learners recognise that some events are more likely to occur than others. They understand the need for a common baseline and spatial alignment when comparing columns of physical collections.

Learners list possible outcomes for a given situation. They use reasoning to explain why one event is more likely than another.

Learners demonstrating solid evidence of

CD 2.1 Chance

- provide reasons as to why one familiar event may be more or less likely to occur than another
- identify situations where all outcomes are equally likely

CD 2.2 Data

- collect and organise data in order to answer questions
- interpret two-way tables and create column graphs using a whole-number labelled axis
- produce and read pictographs or block graphs where units are other than 1:1

Band 3

Learners quantify chance by pairing chance concepts with numeric values on a scale from 0 to 1. They use quantitative data to rank discrete events in order of probability and determine approximate numeric probabilities for other events. Learners discriminate between discrete and continuous data.

Indicators

The curriculum scope for planning and assessing learning within **Band 2**

Knowledge and skills

Working mathematically

Chance

- list a number of possible outcomes for a familiar situation, eg 'at lunchtime I might go to the playground, go to the library or go home'
- identify which outcome is most likely and which is least likely out of a number of possible outcomes for a familiar situation and provide reasons, eg 'I'm more likely to go to the playground than the library at lunchtime because that is what I usually do'
- demonstrate an understanding of 'equal chance' in discrete events, eg explain that all numbers on a die have an equal chance of coming up (even though it 'feels' harder to get a 6!)
- identify and record all possible outcomes in a given discrete event, eg when throwing a cubic die, you may get a 1, 2, 3, 4, 5 or 6
- identify and record all possible combinations in simple situations (ie generating no more than around 12 combinations), eg 'If I have four hats and two pairs of sunglasses, in how many different combinations can I wear them?'
- use everyday language to describe chance involving discrete events, eg a 50 – 50 chance, a one in six chance

Chance

- predict how many trials will be required to achieve a given outcome
- investigate situations involving permutations, and describe discoveries

Indicators

The curriculum scope for planning and assessing learning within **Band 2 (cont)**

Knowledge and skills	Working mathematically
Data <ul style="list-style-type: none"> represent or interpret data on a block graph or pictograph where each block or icon stands for more than one piece of data represent or interpret data in a simple, two-way table represent or interpret data in bar graphs using whole number scales on the axis construct or interpret frequency bar graphs (not necessarily histograms), eg the number of each colour of car in the car park 	Data <ul style="list-style-type: none"> carry out an experiment to test a prediction by recording the results, eg determine how many throws of a die are required to win the Beetle Game (Maths 300) formulate questions suitable to be answered by conducting a survey or by using previously collected data determine categories for organising data in order to answer given questions draw conclusions from data presented as block graphs, bar graphs and two-way tables, eg 'we thought that pies would be the most popular canteen food, but more people liked salad rolls' use technology to generate pictographs and bar graphs using a whole number scale on the axis discuss variation between and within sets of data when presented as graphs, eg note that there is a difference in the number of red smarties counted from different boxes or that the number of red smarties in a box is different to the number of blue smarties

Key Mathematical Language

outcomes, equally likely, even chance, equal chance, combinations, frequency, table, random

Mathematics

Chance and Data

Outcome

Band 3

Band 2

Learners list possible outcomes for a given situation. They use reasoning to explain why one event is more likely than another.

Learners quantify chance by pairing chance concepts with numeric values on a scale from 0 to 1. They use quantitative data to rank discrete events in order of probability and determine approximate numeric probabilities for other events. Learners discriminate between discrete and continuous data.

Learners demonstrating solid evidence of

CD 3.1 Chance

- order events, placing them approximately on a 0 – 1 probability scale, and justify by referring to data obtained in a variety of contexts
- link chance language to positions on the probability scale
- explain why small samples will not necessarily reflect theoretical chance

CD 3.2 Data

- describe the concept of 'average' and calculate the mean of a given data set
- create or interpret graphs using scales where the units include unlabelled decimal increments
- show both discrete and continuous quantities on graphs through the use of grouped or 'interval' data

Band 4

Learners calculate theoretical probabilities for given discrete events. Learners interpret theoretical probabilities or data tables to make and justify comparisons or predictions. They discriminate between 'sample' and 'census' data. They calculate and interpret measures of central tendency.

Indicators

The curriculum scope for planning and assessing learning within **Band 3**

Knowledge and skills

Chance

- match chance language with approximate numeric probability, using a 0 – 1 scale as well as percentages, eg 0 – impossible, half way – even chance, close to 1 – quite likely, 1 – certain
- rank discrete events from most likely to least likely based on the numbers involved, eg 'you are more likely to draw a King than the Queen of Hearts from a deck of cards as there are 4 Kings but only one Queen of Hearts'
- rank events from most likely to least likely and justify based on a range of data, eg which sector of a spinner is most likely to come up based on the relative sizes of the sectors; use tables listing the average number of rain-days per month to determine if rain is likely in a given week
- determine all possible outcomes in discrete events, and so express the chance numerically, eg when throwing a cubic die there are six possible outcomes, so there is a 'one in six' chance of getting a given outcome

Working mathematically

Chance

- predict the result of a large number of trials of a discrete event, eg state how many 6s would be expected if a die were rolled 60 times and justify prediction
- design chance experiments to collect data, predict outcomes and carry out experiments to test predictions
- investigate the relationship between expected outcomes and the number of trials in an experiment, eg using a spinner with sectors of varying sizes, predict how many spins you will need before you see big sectors returning more hits, small sectors less, and check by experiment
- explore probability on a 0 – 1 number line, eg given an event ('there will be a crocodile story on the cover of NT News this month', for example), mark a point on the number line to indicate how likely the event seems

Indicators

The curriculum scope for planning and assessing learning within **Band 3 (cont)**

Knowledge and skills

Working mathematically

Chance (cont)

- explain why there is often a difference between an expected result and the actual result for small trials, eg when six tosses of a coin give four heads and two tails
- determine that an unlikely event may be expected to occur given a sufficiently large number of trials, eg 'it is unlikely that I will win lotto, but so many people play that it is likely that someone will win'

Data

- use and interpret the term 'average' in discussing and interpreting data
- calculate the 'mean' of a given data set
- display continuous data on a histogram through the creation of intervals by grouping, eg a frequency histogram based on learner heights, where height intervals are defined as 80 - 99cm, 100 - 119cm, 120 - 139cm etc.
- present and interpret data in a range of formats including stem and leaf plots, bar and column graphs, line graphs and pie charts
- present and interpret data on graphs using decimal fractions or multiples of 10 as a scale on the axes

Data

- choose an appropriate scale for the axes when representing data graphically
- interpret and draw conclusions from data presented as bar graphs, histograms, line graphs, stem and leaf plots and pie charts, connecting the data to the circumstances in which it was collected, eg 'this graph shows that school attendance increased for the first three weeks but then dropped for the next two, probably because the flu was going around'
- use software to generate a variety of graphs including bar graphs and pie charts

Key Mathematical Language

mean, probability, average, rank, data, expected result, actual result, trial

Mathematics

Chance and Data

Outcome

Band 4

Band 3

Learners quantify chance by pairing chance concepts with numeric values on a scale from 0 to 1. They use quantitative data to rank discrete events in order of probability and determine approximate numeric probabilities for other events. Learners discriminate between discrete and continuous data.

Learners calculate theoretical probabilities for given discrete events. Learners interpret theoretical probabilities or data tables to make and justify comparisons or predictions. They discriminate between 'sample' and 'census' data. They calculate and interpret measures of central tendency.

Learners demonstrating solid evidence of

CD 4.1 Chance

- calculate probabilities for given discrete events
- use theoretical calculations, experimental results or tables of data to determine the probability of an event and so make comparisons and future predictions

CD 4.2 Data

- recognise that most data sets are 'samples' taken to provide a 'measure' of an aspect of a population
- use numbers to represent qualitative data through devices such as Likert scales
- calculate the mean, median or mode of a dataset and determine which of these measures is the most appropriate for a given situation
- use or interpret scales where units are divided into increments representing non-decimal fractions or multiples when creating or reading graphs

Band 5

Learners determine theoretical probabilities of independent, two step events. They display data to show frequency and spread. They interpret and critique their own and published data, making adjustments and inferences where appropriate.

Indicators

The curriculum scope for planning and assessing learning within **Band 4**

Knowledge and skills

Working mathematically

Chance

- explain that probability is a numerical measure of the likelihood of an event occurring
- define the sample space for a given experiment or trial, using tables, grids or tree diagrams
- calculate theoretical probabilities for one or two step discrete events where all possible outcomes are equally likely (and recognise equivalent fractions to demonstrate equal likelihood)
- determine probabilities for discrete events where all possible outcomes are not equally likely by deriving ratios from frequency data obtained either through experiment or from existing data tables
- determine probabilities relating to non-discrete events by grouping data into intervals and using frequency data obtained either through experiment or from existing data tables

Chance

- determine all possible outcomes for an experiment and determine the probability of each; carry out the experiment to test the predictions, eg determine all possible outcomes of tossing two dice, calculate the probability of each result and compare the results from 200 throws against the predictions
- design and construct a device that will produce results in accordance with pre-determined probabilities, eg design a spinner that will give a 0.7 chance of blue, 0.5 chance of yellow and a 0.2 chance of red
- devise and conduct experiments to determine probabilities experimentally, eg determine the probability of a dropped drawing pin landing point up

Indicators

The curriculum scope for planning and assessing learning within **Band 4 (cont)**

Knowledge and skills	Working mathematically
Data <ul style="list-style-type: none"> convert non-numeric data such as strength of opinion to numeric data through devices such as Likert scales and represent using tables or graphs interpret or represent data on graphs using scales based on non-standard units and which include unlabelled graduations represent time related data on a graph by joining the data points using a line or curve which approximates best fit present and interpret data in a range of formats including dot frequency displays for univariate data and scatter plots for bivariate data calculate either the mean, median or mode to summarise data as appropriate, eg use median where the data is skewed to one extreme, and mode where the data is categorical and the most common or popular occurrence is of interest use fractions or percentages in order to compare data, eg a cricketer's strike rate of runs taken over the number of balls faced may be expressed as a fraction, a decimal or a percentage and so compared with that of other players distinguish between causes and other factors when interpreting relationships in data, eg the national road toll data seems to indicate that the NT is safer until you consider the relative populations write or present a verbal summary of information presented in graphs, eg 'this data shows that people with larger feet tend to be taller, although this is not always true' extract information from a wide variety of data sources, including spreadsheets, tables, diagrams, charts and graphs explain why data collected through a census is more reliable than sampled data, and why the larger and more representative the sample, the more reliable the results 	Data <ul style="list-style-type: none"> apply the entire statistical process to investigate issues of interest, ie pose a question, collect relevant data, summarise and present data, interpret data, present findings develop and trial a questionnaire or survey form, ensuring that there is no ambiguity in the questions develop and trial a survey in order to collect and interpret related, bivariate data, eg time spent on internet and time spent watching television demonstrate consistency in data collection, eg ensure that measurements are all taken using the same method enter information into a pre-configured database in order to organise and query data discuss the likely validity of the data based on the number of samples taken, the group that they were taken from and the size of the population produce a quick sketch graph to give an indication of the relationship they expect to find in given bivariate example, eg blood alcohol content of a driver plotted against likelihood of an accident may be expected to show a steepening upward curve interpret situations where there is a large difference between the mean and the median, eg the mean was higher than the median because of those two very tall students in our class critically appraise data collection methods based on the usefulness of the data for its intended purpose, eg too many people chose 'None of the above', next time we should do more research and include more choices on the survey critically analyse articles presented in the media that make use of statistics in an attempt to support a case or argument

Key Mathematical Language

median, mode, census, sample, reliable, theoretical probability, experimental probability, tree diagram, sample space, validity, line graph, histogram, scatter plot, skewed, categorical, continuous, increments

Mathematics

Chance and Data

Outcome

Band 5

Band 4

Learners calculate theoretical probabilities for given discrete events. Learners interpret theoretical probabilities or data tables to make and justify comparisons or predictions. They discriminate between 'sample' and 'census' data. They calculate and interpret measures of central tendency.

Learners determine theoretical probabilities of independent, two step events. They display data to show frequency and spread. They interpret and critique their own and published data, making adjustments and inferences where appropriate.

Learners demonstrating solid evidence of

CD 5.1 Chance

- quantify chance in straightforward two-step discrete events, such as rolling two dice

CD 5.2 Data

- represent multiple variables using a single chart or table. They use methods such as box and whisker plots to indicate the nature of the spread of data as well as the frequency.

Band 5+

Learners determine theoretical probabilities of complex events. They explain how the uncertainty of a prediction is a function of the amount of variation in a dataset. They explain and calculate standard deviation.

Indicators

The curriculum scope for planning and assessing learning within **Band 5**

Knowledge and skills

Working mathematically

Chance

- calculate the probability of discrete two-step independent events where equal probability can be assumed within the sample space of each step, eg the probability of getting a sum of 7 from 2 dice
- use published data to assign probabilities to events, including compound events, eg use meteorological data to state the probability of a day in Darwin in January being wet and having a maximum of over 30°C
- calculate two-step probabilities involving 'and', 'or' or 'not' statements, ie if event one and event two must occur, the probabilities are multiplied; if event one or event two must occur, the probabilities are added; if event one but not event two must occur, the probability of event one is multiplied with the value of 1 – the probability of event two
- represent the sample space of two-step events using set notation, tree diagrams, Venn diagrams or lattice diagrams
- apply and use ratio and 'odds' as measures of probability

Chance

- analyse situations involving random events and chance, particularly where the results seem counter-intuitive
- use census data to assign probabilities, eg use data from the Australian Bureau of Statistics to determine the probability that someone in your school is diabetic given the size of your school's population
- investigate long-run probability in more complex events by carrying out computer based simulations
- investigate the accuracy of subjectively assigned odds, eg examine the success ratios of all horses assigned 3:1 odds over a given period of race meetings

Indicators

The curriculum scope for planning and assessing learning within **Band 5 (cont)**

Knowledge and skills	Working mathematically
Data <ul style="list-style-type: none"> design simple questionnaires and undertake trials to assess the quality of the questions, eg try the questionnaire with a small sample of people and follow up with an interview to probe its effectiveness present multiple sets of univariate data on a single graph or chart in order to compare them, eg back-to-back stem and leaf plots, stacked column graphs calculate inter-quartile range and construct box and whisker plots from raw data using the median, quartiles and range create line graphs where each data point is represented as a box and whisker plot so that the spread of the data is revealed identify inconsistencies and potential errors in primary raw data, eg extreme outliers found in group data on pulse rate may indicate an error in recording data 	Data <ul style="list-style-type: none"> collect information, including bivariate data, from a variety of sources including databases and use to support an opinion or point of view explain why it is desirable for the collection of a data sample to be randomised and suggest ways this could be achieved critically appraise data from a variety of sources and determine if it is presented in a misleading way, eg a graph with an inappropriate scale designed to emphasise or minimise apparent changes use a computer or calculator to investigate the effect of outliers on the mean and median of a data set refine data electronically in order to separate the relevant information, eg to determine if Rock music appeals more to males than to females, download an appropriate Census at School sample and manipulate in a spread sheet in order to determine what percentage of each sex put Rock music as a preference

Key Mathematical Language

discrete, box and whisker plots, 2-step events, set notation, Venn diagram, lattice diagram, ratio, odds, outliers, univariate, bivariate, interquartile range, long-run probability

Mathematics

Chance and Data

Outcome

Band 5+

Band 5

Learners determine theoretical probabilities of independent, two step events. They display data to show frequency and spread. They interpret and critique their own and published data, making adjustments and inferences where appropriate.

Learners determine theoretical probabilities of complex events. They explain how the uncertainty of a prediction is a function of the amount of variation in a dataset. They explain and calculate standard deviation.

Learners demonstrating solid evidence of

CD 5+.1 Chance

- quantify chance in complex situations involving mutually exclusive, complimentary and compound events

CD 5+.2 Data

- determine the standard deviation of a discrete random variable

Indicators

The curriculum scope for planning and assessing learning within **Band 5+**

Knowledge and skills

Working mathematically

Chance

- determine probabilities involving complex, dependent and conditional events, eg the probability of winning first division in Tattslotto

Chance

- investigate and report accurately on the probabilities involved in games

Data

- calculate standard deviation of a sample, and comment on the reliability of the sample as a result
- plot primary or secondary bivariate data to produce a scatter plot. Determine a line of best fit for the data
- describe scatter plots as suggesting positive, negative or no association (correlation) and place informal estimations of correlation on a scale of - 1 to 1, eg 'about - 0.8, a strong negative correlation'
- design nested and layered tables to represent data involving more than two variables, eg plan how to represent information about age, gender and music preferences in one table
- use either mean or median smoothing to smooth a plot of data over time, eg when studying temperature variations

Data

- critically analyse samples obtained through self designed questionnaires or other data sampling techniques, eg decide if evidence exists suggesting sample is skewed or too small and suggest improvements
- analyse opinion data for demographic bias, eg access data from Census at School and compare opinion or value data with postcode
- investigate different categories of samples, eg convenience, random, self-selection, stratified-random; choose a suitable sample method for a proposed investigation and justify
- use electronic means to provide summary statistics, including measures of spread, and appropriate visual displays, eg scatter plots or time series plots
- critically interpret statistical material, including tables and graphs, from sources such as magazines, newspapers, information leaflets and school textbooks

Key Mathematical Language

mutually exclusive, dependent, conditional, line of best fit, correlation, demographic, standard deviation

